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Cutting potato ball from small whole potato - using pair of rotating flat knives with semicircular grooves

C83-040938 D/S: E(AT BE CH DE FR GB IT LI LU NL SE).

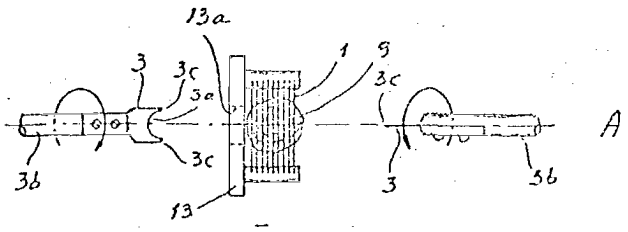
A small potato is clamped while two rotating blades are advanced into it from opposite sides. Each of the blades is flat and has a semicircular notch. The blades are advanced along their common rotating axis until they are in close proximity to define a spherical potato ball. Rotation of the blades is then halted and they are moved in unison through the potato to discharge the potato ball.

ADVANTAGE

The appts. can process small potatoes which might otherwise be discarded.

DETAILS

The potato (9) is held between clamping fingers (1). The blades (3c), mounted on rotating shaft (3b) are advanced into the potato but pref. they do not contact and leaves a small bridge of potato which links the ball to the remainder. In an embodiment, the blades are synchronised to be offset by 90° to cut the ball completely from the potato. In another embodiment, the potato ball is discharged, after cutting, by the operation of a pushing rod.(23pp295DwgNo8/11).
(E) ISR: DE2915810 DE2541703.



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(54) **Method and apparatus for mechanized production of potato balls.**

(57) The present invention is concerned with a method for mechanized production of potato balls as well as with an apparatus for carrying out this method. In prior art, potato balls (9) have been cut only manually by means of a tool that looks like a hemispherical scoop provided with a shaft (6b). In such a case, only large potatoes can be used, and out of each potato, only one or two potato balls can be cut, for which reason the loss from each potato becomes rather large. The objective of the present invention is to eliminate, e.g., these drawbacks, which is achieved by means of an apparatus which comprises a feeder device (2) connected to one or several grasping means (1), which grasping means are arranged between or can be shifted into a position between their own respective pair of equally shaped, thin and readily exchangeable cutter blades (3) with concavely semicircular cutting edges (3a), placed as facing each other. The cutter blades (3) are, e.g., by means of an electric motor (4), arranged so as to revolve around their axes (3b), which are appropriately by means of cylinder-piston devices (5) displaceable in their longitudinal direction away from each other and towards each other until the paths of rotation of the tips of the opposite cutter blades (3) are at least almost coinciding. By means of this apparatus, it is possible to use both very small potatoes and discs out of larger potatoes.

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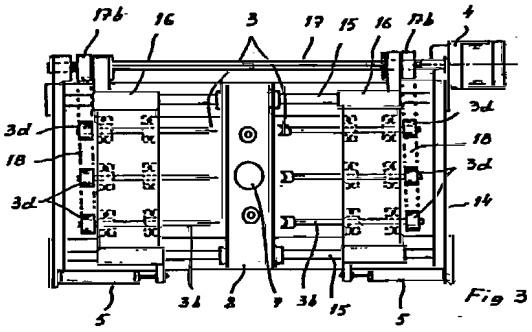

Fig 3

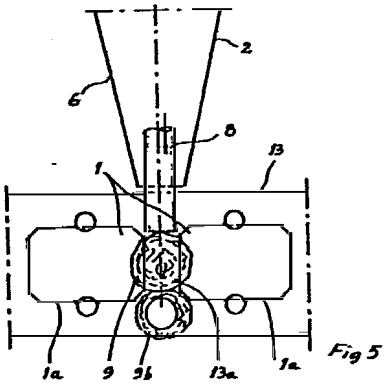

Fig 5

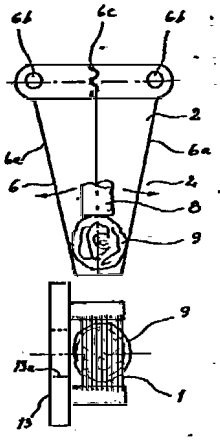

Fig 6

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Method and apparatus for mechanized production of potato balls

The present invention is concerned with a method for mechanized production of potato balls as well as with an apparatus for carrying out this method.

In prior art, potato balls have been prepared only manually, which has taken place by means of a manual tool having the shape of a hemispherical scoop provided with a shaft, resembling the tool that is used for forming icecream balls. In this procedure, rather large potatoes must be used, one or several potato balls being taken out of each potato. Thus, it is obvious that the loss from each potato becomes relatively large. Smaller potatoes cannot be used, because they do not provide a sufficient grasping face and, moreover, increase the risk that the relatively sharp edge of the tool penetrates out of the potato during the formation of the potato ball and damages the hand of the operating person. Moreover, the potato balls have a tendency to become dark if they include some of the portion of the potato placed next underneath the peel.

The object of the present invention is to eliminate the above drawbacks and to make it possible to use rather small potatoes, which are otherwise used only as fodder or allowed to remain on the field when the potatoes are harvested. The method in accordance with the invention is characterized in that preferably small potatoes are fed one by one in between a grasping member, which fixes the potato in the working position, whereupon two equally shaped thin cutter blades, which revolve as arranged as facing each other and which have substantially concave semicircular cutting edges, are run against the potato simultaneously each from its side until the extreme tips of both cutter blades run, during rotation of the cutter blades, along paths that are at least almost coinciding. Hereby the cutting edges

of the cutter blades act upon the potato and cut a potato ball, whose dimension is determined by the size of the edges of the cutter blades. The potato ball obtained is released and fed out into a container, whereas the rests of the potato are passed into another container.

It is characteristic of the apparatus in accordance with the invention that the apparatus comprises a feeder device connected to one or several grasping means, which grasping means are arranged between or can be shifted into a position between their own respective pair of equally shaped, thin and readily exchangeable cutter blades of concavely semicircular cutting edges, placed as facing each other. The cutter blades are, e.g. by means of an electric motor, arranged so as to revolve around their axes, which are appropriately by means of cylinder-piston devices displaceable in their longitudinal direction away from each other and towards each other until the paths of rotation of the tips of the cutter blades facing towards each other are at least almost coinciding.

The other characteristics of the invention come out from the attached patent claims 1 to 28.

The invention will be examined in more detail below with reference to the attached drawing, wherein

Figure 1 shows an apparatus in accordance with the invention as viewed from the side,

Figure 2 shows the apparatus of Fig. 1 as viewed from the right,

Figure 3 shows the apparatus as viewed from the top,

Figure 4 shows an example of the way in which the drive belts of the apparatus are drawn,

Figure 5 is a detail view of the feeder device and of a grasping means as viewed in the longitudinal direction of the apparatus,

Figure 6 shows the same details as a side view,

Figure 7 shows the grasping means as viewed from above, and

Figures 8 to 11 show different stages of the cutting of a potato ball.

The apparatus in accordance with the invention comprises a feeder device 2 connected to one or several grasping means 1, which grasping means 1 either are arranged between or can be shifted into a position between their own respective pair of equally shaped thin and readily exchangeable cutter blades 3 of concavely semicircular cutting edges 3a, placed as facing each other. These cutter blades 3 are, e.g. by means of an electric motor 4, arranged as revolving around their axes 3b, which are appropriately by means of cylinder-piston devices 5 displaceable in their longitudinal direction away from each other and towards each other until the paths of rotation of the tips 3c of the cutter blades facing each other are at least almost coinciding.

By means of this apparatus, appropriately small potatoes 9, which are otherwise only suitable for fodder, can be fed one by one in between the grasping means 1 of the apparatus, which fix each potato in the working position between a pair of cutter blades 3. The rotary cutter blades 3 are hereupon pushed simultaenously, each of them from its own side, towards the potato 9 until the extreme tips 3c of both cutter blades 3 run, while the blades revolve, along paths that are at least almost coinciding. The cutting edges 3a of the cutter blades hereby act upon the potato 9 and cut a potato ball 9a, whose dimensions are determined by the size of the cutting edges 3a. The potato ball 9a obtained is released and fed into a container, whereas the rests 9a of the potato 9 are passed into another container.

The feeder device 2 preferably consists of a conical funnel 6 placed above each grasping means 1 or at each feeding station, which funnel is, along a vertical plane running through the centre of the grasping

means 1 placed underneath, divided into two identical halves 6a. The halves 6a are at their outer upper edges suspended on horizontal, parallel shafts 6b, whereby the funnel 6 is, e.g., by means of a cog system 6c, symmetrically openable in relation to the said vertical plane and to the grasping means 1 so that each new potato 9 that is fed through the funnel 6 into the grasping means 1 falls down in a substantially central position.

Centrally in each funnel 6, a vertical plug 8 is preferably provided, which is acted upon by a cylinder-piston device 7 and which presses one potato 9 at a time down between the grasping means 1 into the correct working position in relation to the cutter blades 3.

In an apparatus which comprises several pairs of cutter blades, all of the feeder devices 2 are appropriately placed side by side, whereby common longitudinal shafts 6b may be employed for suspending the funnel halves 6a and all of the feeding-in plugs 8 of the apparatus may be united by means of a yoke 10, which transmits the feeding movement from a cylinder-piston device 7 to all of the plugs 8. The movement of the yoke 10 is stabilized appropriately by means of two vertical guide pistons 12 provided at each end of the yoke 10.

The grasping means 1 consist, e.g., of thin, spring-loaded pinching elements arranged so as to clamp around their respective potatoes around the waist line of the potato. These grasping means 1 are appropriately placed along the periphery of one or several circular discs rotable around a horizontal shaft (not shown) parallel to the shafts 3b of the cutter blades 3, or possibly at the ends of arms radially projecting from this horizontal shaft, the said arms being arranged as stepwise revolving around the said shaft. During the stepwise rotation, each grasping means 1 passes by a feeding-in station, a cutting station, as well as by a feeding-out station.

Another, highly favourable embodiment of the

grasping means 1 comprises lamella packages 1a arranged in pairs and consisting of vertical substantially rectangular plates whose corners are preferably bevelled and which are placed at a distance from each other, the said lamella packages 1a being securably attached to a beam 13 placed centrally in the apparatus, preferably in the middle between the cutter blades 3 of the apparatus, facing each other, on each side of a hole 13a provided in the beam 13 for each pair of cutter blades 3. The plate edges at the ends of the lamella packages 1a that are directed towards the space in front of each hole 13a in the transverse beam 13 are supposed to cut somewhat into and to hold a potato 9 pressed down into the space.

The lamella packages 1a are readily exchangeable. The length of the lamella packages 1a that are used must be adapted to the dimension of the cutter blades 3 so that an appropriate space is obtained for the cutter blades 3 between the lamella packages 1a. In apparatuses with several pairs of cutter blades 3, both ends of the centrally placed lamella packages appropriately constitute parts of the grasping means 1 of two adjoining pairs of cutter blades 3. The bevelled upper corners of the lamella packages 1a are helpful in centering a potato 9 that is fed in.

Figures 1 to 3 illustrate an apparatus which comprises two substantially horizontal, parallel guides 15 attached to a frame construction 14, the transverse beam 13 with the grasping means 1 and with the feeder device 2 with connected cylinder-piston device 7 being fixed to the middle portion of the said guides 15. On each side of this transverse beam 13, a sledge 16 is arranged that is displaceable by means of a cylinder-piston device 5 along both of the guides 15, the shafts 3b of the cutter blades 3 facing each other being journalled to the said sledges 16. In accordance with the figure, these shafts 3b are driven by means of an

electric motor 4 coupled to a spline shaft 17, along which shaft 17 belt pulleys 17b of the two belts 18 which bring the cutter blades 3 into rotaty movement via the pulleys 3d can be displaced.

The apparatus shown in the drawing includes three pairs of cutter blades, but it is obvious that the number may vary as required. The cutter blades 3 are, preferably by means of cogbelts, made to revolve in pairs in the same direction and with the same speed of revolution, e.g., so that the two extreme pairs 3 revolve in one direction and the middle pair 3 in the opposite direction, whereby the angle between the cutting edges 3a of the opposite cutter blades 3 remains constant, e.g. 90^{o}. In such a case, the opposite cutter blades 3 may, when cutting a potato ball 9a, be shifted to such an extent towards each other that the tips 3c of the cutter blades overlap each other to some extent, whereby the potato ball obtained is at the same time liberated from the annular rest 9b of the potato 9. The cogbelts 18 are hereat passed over the belt pulleys 17b and 3d, as is illustrated in Fig. 4, whereat necessary tension of the belts 18 is obtained at the same time.

In order to prevent the potato ball 9a from being caught on the revolving cutter blades 3 before it is totally cut loose, the pulleys 3d may be appropriately fixed somewhat eccentrically on the shafts 3b of the cutter blades 3. Thereby the speeds of revolution of the cutter blades 3 differ somewhat from each other during one revolution, so that the relative angle between the cutting edges 3a of the cutter blades 3 performs a pendulating movement between certain limit values during each revolution.

The opposite cutter blades 3 may also be made to rotate in opposite directions, whereat they are appropriately driven by means of round belts 18. Their shifting towards each other must, in this case, be stopped before the paths of rotation of the tips 3c of

the opposite cutter blades coincide. In this case the cut potato ball 9a still adheres to the rest 9a of the potato 9 along a thin annular ring. The cut potato ball 9a is appropriately detached in connection with the feeding-out from the apparatus by means of a hollow pipe provided in the feeding-out station and of a plug jointly operative with same. The inner diameter of the hollow pipe must be substantially equal to the diameter of the cut potato ball 9a.

Figures 8 to 11 illustrate the various working phases of an apparatus in which the opposite cutter blades 3 revolve in the same direction. In Fig. 8, the rotary cutter blades 3 are in their starting positions and the potato 9 has been pushed down into the correct working position in between the grasping means 1. In Fig. 9, the revolving cutter blades 3 have been shifted to their inner extreme positions, whereat a potato ball 9a is obtained. Hereupon the rotary movement of the cutter blades 3 is stopped and, while maintaining their relative distance in accordance with Fig. 10, they are shifted a distance to either direction to the side, the potato ball 9a being maintained between the cutter blades 3 owing to their relative angular position. The cutter blades 3 are shifted preferably to a position above a container (not shown), into which the potato ball 9a falls down when the cutter blades are after this shifted in the direction away from each other, restored back to their stating positions and made to revolve again. Hereupon a new potato 9 is fed into the working position, the said new potato pushing off the annular rest 9a of the earlier cut potato 9, which rest 9a hereby appropriately falls down into a container placed underneath the grasping means 1.

The potato balls may also be cut out of strips or discs of larger potatoes, in which case the thickness of the strips or discs is substantially equal to the diameter of the potato balls to be cut off. Out of one

disc, e.g., three of four, or possibly even more potato balls can be cut off at the same time, each ball being cut off by a pair of cutter blades of its own. For this purpose, the shafts 3b of each cutter blade 3 are appropriately provided with two universal joints, which permits simultaneous application of any desired number of pairs of cutter blades 3 to the potato disc.

When potato balls 9a are cut out of large potato discs, the shafts 3b of two opposite cutter blades 3 can be appropriately provided with heads of their own not revolving along with the shaft 3b, which head is provided with a number of parallel, adjoining outgoing shafts of cutter blades 3, whereat the movement of rotation of the incoming shaft 3b is transmitted to all of the outgoing shafts provided with cutter blades by means of cogwheels. By means of such heads, up to six or seven potato balls can be cut out of each disc.

In order to facilitate the exchange of lamella packages 1a when shifting from cutter blades 3 of one dimension to those of another dimension, it is appropriate to have ready sets of lamella packages 1a, intended for the dimensions concerned, as fixed to separate rails, which can be rapidly attached to or detached from the transverse beam 13 as required.

The cylinder-piston devices 5, 7 of the apparatus are appropriately connected to an integrated pneumatic system, which is, together with the electric motor 4, operated by means of a knob system. In order to stabilize the movements of the two cylinder-piston devices 5 that push the opposite cutter blades 3 away from or towards each other, these cylinder-piston devices are preferably mechanically interconnected, e.g., by means of racks. It is also possible that the movement of shifting of the cutter blades 3 takes place totally in the mechanical way.

The cutter blades 3, which can be readily exchanged, e.g., by detaching two screws on the shaft 3b,

may also be shaped so that the cut potato balls 9a obtain a more or less elliptic form, which can also be achieved thereby that the cutter blades 3 are not shifted exactly so much towards each other as is required in order to obtain globe form of the potato balls 9a, or thereby that they are shifted towards each other further than what is required for globe form.

The fastening of the potatoes may, of course, also be arranged in a way different from what is described above. Likewise, the shafts 3b of the cutter blades 3 may also be driven by means of separate belts from the spline shaft 17.

WHAT IS CLAIMED IS:

1. A method for mechanized production of potato balls, c h a r a c t e r i z e d in that preferably small potatoes (9) are fed one by one in between a grasping member (1), which fixes the potato (9) in the working position, whereupon two equally shaped thin cutter blades (3), which revolve as arranged as facing each other and which have substantially concavely semicircular cutting edges (3a), are run against the potato simultaneously each from its side until the extreme tips (3c) of both cutter blades run, during rotation of the cutter blades, along paths that are at least almost coiniciding, whereat the cutting edges (3a) of the cutter blades act upon the potato (9) and cut a potato ball (9a), whose dimension is determined by the size of the edges (3a) of the cutter blades, whereinafter the potato ball (9a) obtained is released and fed out into a container, whereas the rests (9b) of the potato are passed into another container.

2. A method as claimed in claim 1, c h a r a c t e r i z e d in that the potatoes (9) are fed in between the grasping means (1) by means of a piston (8), which presses the potato (9) down into the correct working position in relation to the cutter blades (3).

3. A method as claimed in claim 1 or 2, c h a r a c t e r i z e d in that the cutter blades (3) rotate in opposite directions, whereat their shifting towards each other is stopped before the paths of rotation of the tips (3a) of the two cutter blades coincide, so that the cut potato ball (9a) is still connected with the rest of the potato (9) along a thin annular ring.

4. A method as claimed in claim 3, c h a r a c t e r i z e d in that the potato ball (9a) is detached from the rest (9b) of the potato (9) in connection with the feeding-out, preferably by means of a plug and

a hollow pipe, whose inner diameter is substantially equal to the diameter of the potato ball cut off.

5. A method as claimed in claim 1 or 2, characterized in that the cutter blades (3) rotate in the same direction and at the same speed of rotation, whereat the semi-circular cutting edges (3a) are all the time preferably at an angle of 90° in relation to each other so that the cutter blades (3) can be shifted towards each other to such an extent that the tips (3a) of the two cutter blades overlap each other to some extent and that the potato ball (9a) obtained becomes entirely cut-off.

6. A method as claimed in claim 5, characterized in that the potato ball (9a) is after the cutting retained between the cutter blades (3), whereupon the movement of rotation of the cutter blades is appropriately stopped and the cutter blades (3), with their relative distance retained, are shifted a distance to the side preferably to a position above a container, into which the potato ball (9a) falls down when the cutter blades (3) are hereupon shifted in the direction away from each other, restored back to their starting positions, and again made to rotate.

7. A method as claimed in claim 1, characterized in that the potato balls (9a) are cut out of discs of larger potatoes, whereat the thickness of the discs is substantially equal to the diameter of the potato ball (9a) that is to be cut, as well as that, out of one disc, at the same time, two or more potato balls (9a) are cut by means of a pair of cutter blades (3) of each potato ball's own.

8. A method as claimed in claim 1, characterized in that the potato balls (9a) are cut out of potato strips, whose both short sides are substantially equal to the diameter of the potato ball (9a) that is to be cut.

9. A method as claimed in claim 1, c h a r - a c t e r i z e d in that the speeds of rotation of the cutter blades (3) differ from each other to some extent during a revolution so that the relative angle between the cutting edges (3a) of the cutter blades pendulates between certain limit values during a revolution when the cutter blades (3) revolve in the same direction.

10. A method as claimed in any of the preceding claims, c h a r a c t e r i z e d in that the potato ball (9a) is cut as completely round like a ball or as somewhat ellpictic.

11. An apparatus for carrying out the method as claimed in claim 1, c h a r a c t e r i z e d in that the apparatus comprises a feeder device (2) connected to one or several grasping means (1), which grasping means (1) are arranged between or can be shifted into a position between their own respective pair of equally shaped, thin and readily exchangeable cutter blades (3) with concavely semicircular cutting edges (3a), placed as facing each other, which cutter blades (3) are, e.g. by means of an electric motor (4), arranged so as to revolve around their axes (3b), which are appropriately by means of cylinder-piston devices (5) displaceable in their longitudinal direction away from each other and towards each other until the paths of rotation of the tips (3c) of the cutter blades facing towards each other are at least almost coinciding.

12. An apparatus as claimed in claim 11, c h a r a c t e r i z e d in that the feeder device (2) of each grasping means (1) consists of a conical funnel (6) divided into two identical halves (6a) by a vertical plane passing through the centre of the grasping means (1), the said halves (6a) being at their outer upper edges suspended on horizontal, parallel shafts (6b), whereat the funnel (6) is, e.g., by means of a cog system (6c), symmetrically openable in

relation to the said vertical plane and grasping means (1).

13. An apparatus as claimed in claim 12, c h a r a c t e r i z e d in that centrally in each funnel (6), a vertical plug (8) is provided which can be acted upon by a cylinder-piston device (7) and which is supposed to press a potato (9) down in between the grasping means (1) placed underneath. ,

14. An apparatus as claimed in claim 13, c h a r a c t e r i z e d in that all of the feeding plugs (8) of the apparatus are interconnected by means of a yoke (10), which transfers the feeding movement from a common cylinder-piston device (7) to all the plugs (8), whereat the movement of the yoke (10) is appropriately stabilized by means of two vertical guide pistons (12) arranged at each end of the yoke (10).

15. An apparatus as claimed in any of claims 11 to 14, c h a r a c t e r i z e d in that the grasping means (1) consist of thin, spring-loaded pinching elements arranged so as to clamp around their respective potatoes (9) around the waist line of the potato.

16. An apparatus as claimed in any of claims 11 to 14, c h a r a c t e r i z e d in that the grasping means (1) consist of lamella packages (1a) arranged in pairs, consisting of vertical, substantially rectangular plates whose corners are preferably bevelled and which are placed at a distance from each other, the said lamella packages (1a) being securably attached to a beam (13) placed centrally in the apparatus, preferably in the middle between the cutter blades (3) of the apparatus, facing each other, on each side of a hole (13a) provided in the beam (13) for each pair of cutter blades (3), whereat the plate edges at the ends of the lamella packages 1a that are directed towards the space in front of each hole (13a) in the transverse beam (13) are supposed to cut somewhat into and to hold a potato (9) pressed down into the space.

17. An apparatus as claimed in claim 16, c h a r a c t e r i z e d in that the said lamella packages (1a) are readily exchangeable and that the length of the lamella packages (1a) must be adapted to the dimension of cutter blades (3) used.

18. An apparatus as claimed in claim 15, c h a r a c t e r i z e d in that the grasping means (1) are arranged along the periphery of one or several circular discs rotable around a horizontal shaft that is parallel to the shafts (3b) of the cutter blades (3) or at the ends of arms projecting radially from this horizontal shaft, the said arms being arranged so as to revolve stepwise around the said shaft.

19. An apparatus as claimed in claim 18, c h a r a c t e r i z e d in that, during the stepwise rotation, the grasping means (1) pass by stations for feeding-in, cutting, and feeding-out, whereat the apparatus is, at the feeding-out station, provided with a plug jointly operative with a hollow pipe.

20. An apparatus as claimed in claim 17, c h a r a c t e r i z e d in that the apparatus includes two substantially horizontal, parallel guides (15) attached to a frame construction (14), the transverse beam (13) with the grasping means (1) and with the feeder device (2) with connected cylinder-piston device (7) being fixed to the middle portion of the said guides (15), and on each side of this transverse beam (13), a sledge (16) is arranged that is displaceable by means of a cylinder-piston device (5) along both of the guides (15), the shafts (3b) of the cutter blades (3) facing each other being journalled to the said sledges (16) and the shafts (3b) being driven by means of an electric motor (4) coupled to a spline shaft (17), along which shaft (17) belt pulleys (17b) of the two belts (18) which bring the cutter blades (3) into rotary movement via the pulleys (3d) can be displaced.

21. An apparatus as claimed in claim 20, c h a r a c t e r i z e d in that the apparatus comprises three pairs of cutter blades (3), which are, by means of cogbelts (18), made to rotate in pairs in the same direction and at the same speed of rotation, e.g., so that the two extreme pairs revolve in one direction and the middle pair in the opposite direction, whereat the angle between the cutting edges (3a) of, opposite cutter blades (3) remains constant.

22. An apparatus as claimed in claim 21, c h a r a c t e r i z e d in that the cylinder-piston devices (5, 7) of the apparatus are coupled to an integrated pneumatic system, which, together with the electric motor (4), is operated by means of a knob system.

23. An apparatus as claimed in claim 22, c h a r a c t e r i z e d in that the two cylinder-piston devices (5) which shift the opposite cutter blades (3) away from and towards each other are mechanically interconnected, e.g., by means of racks.

24. An apparatus as claimed in claim 20, c h a r a c t e r i z e d in that the belt pulleys (3d) on the shafts (3b) of the cutter blades are somewhat eccentric, whereby the relative angle between the cutting edges (3a) of two opposite cutter blades (3) pendulates between certain limit values during each revolution.

25. An apparatus as claimed in claim 19 or 20, c h a r a c t e r i z e d in that the opposite cutter blades (3) are made to rotate in opposite directions, whereat they are appropriately driven by means of round belts (18).

26. An apparatus as claimed in claim 11, c h a r a c t e r i z e d in that the shafts (3b) of each cutter blade (3) are provided with two universal joints each, which permits an adaptation of the cutter blades (3) in such a way in relation to each other that,

e.g., three or more potato balls (9a) can be cut simultaenously out of a disc of a larger potato (9).

27. An apparatus as claimed in claim 20, c h a r a c t e r i z e d in that ready sets of lamella packages (1a) intended for cutter blades (3) of different dimensions have been in advance fastened to separate rails, which may be rapidly attached to or detached from the transverse beam (13) as required.

28. An apparatus as claimed in claim 11, c h a r a c t e r i z e d in that, on the shaft (3b) of each cutter blade, a head is provided which does not rotate along with the shaft (3b) and which is provided with a number of parallel, adjoining outgoing shafts for cutter blades (3), whereat the movement of rotation of the incoming shaft (3b) is transmitted to all of the outgoing shafts provided with cutter blades (3) by means of cogwheels.

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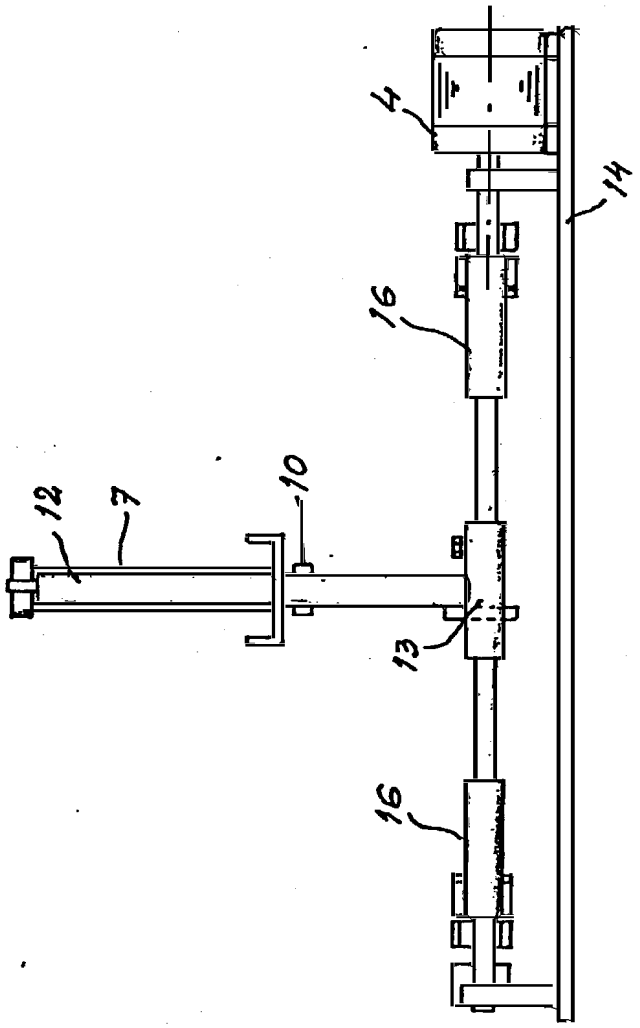

Fig 1

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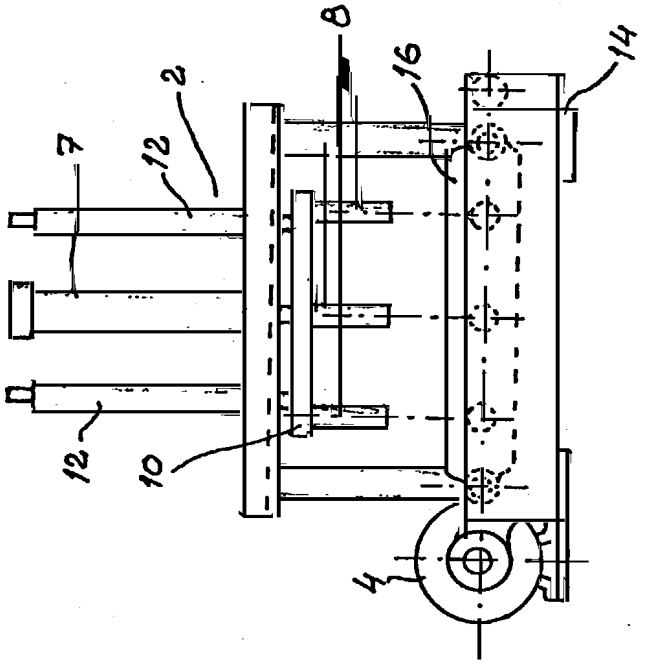

Fig 2

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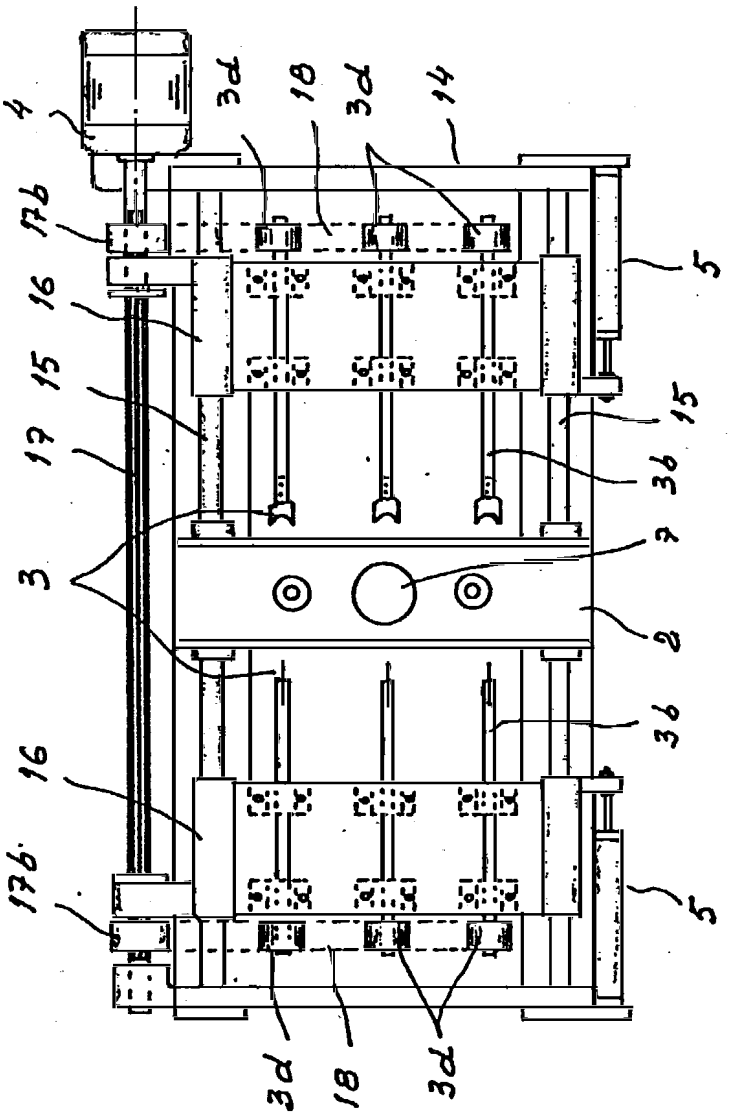

Fig 3

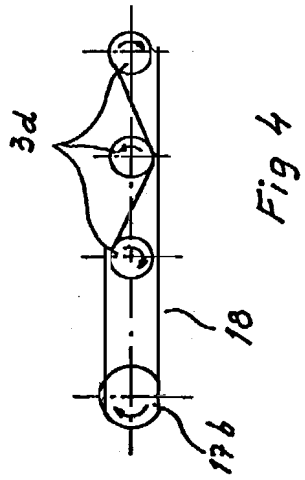

Fig 4

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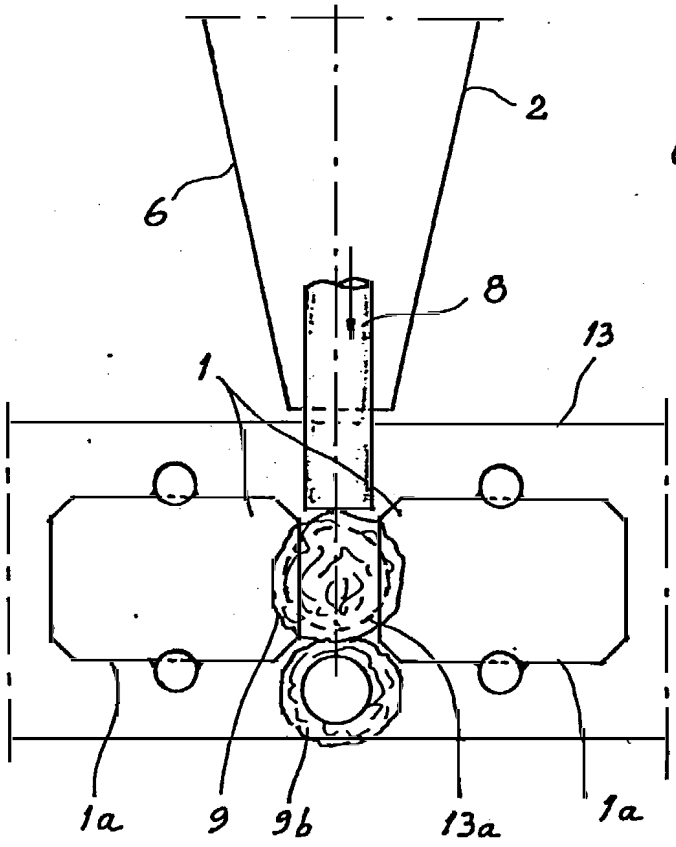

Fig 5

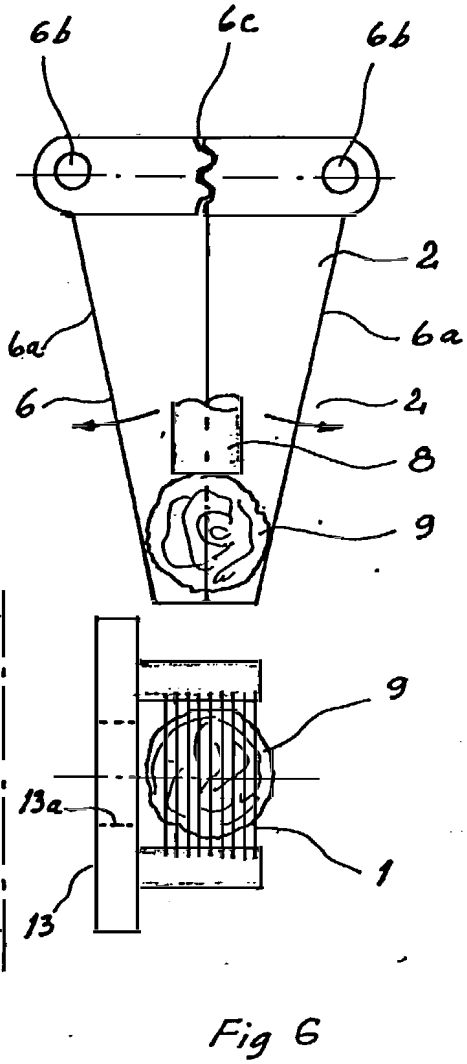

Fig 6

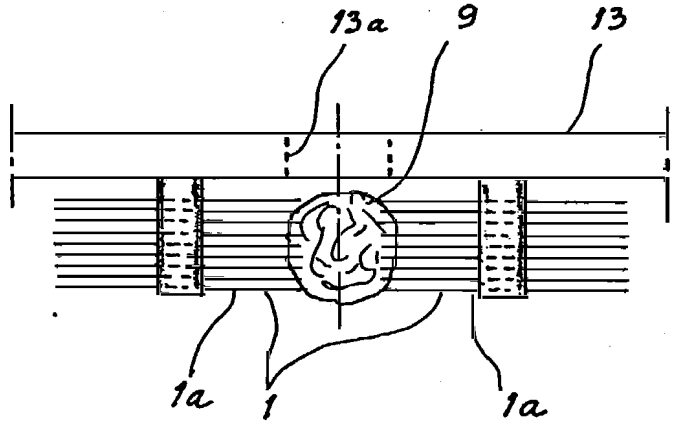

Fig 7

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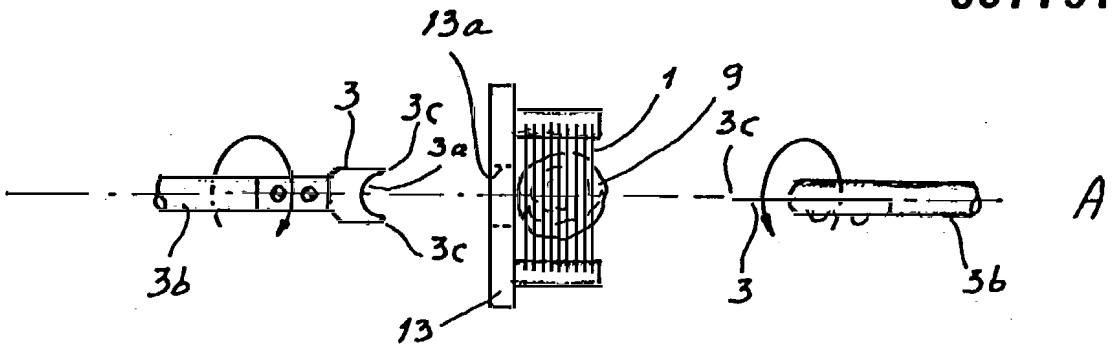


Fig 8

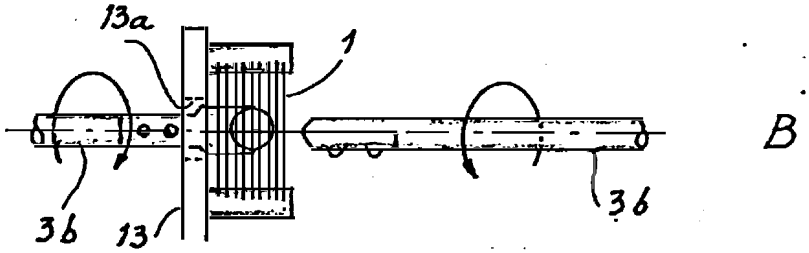


Fig 9

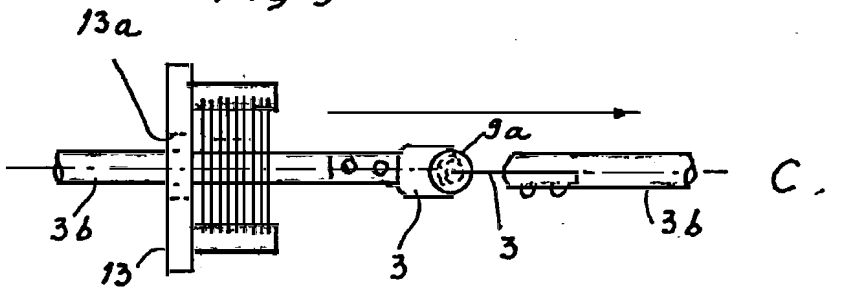


Fig 10

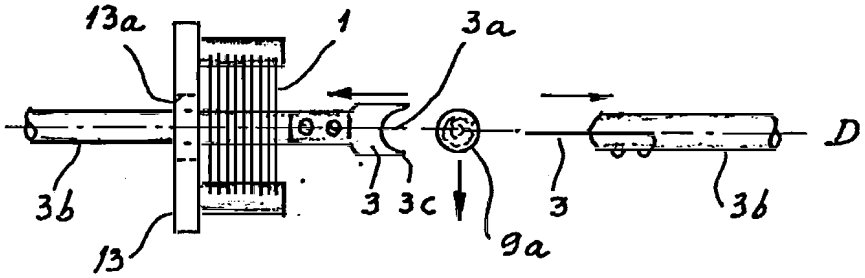
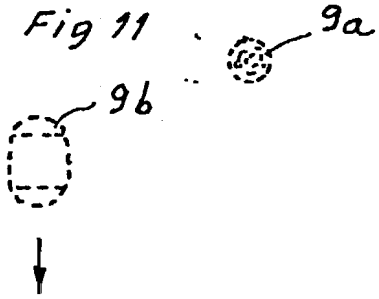


Fig 11



European Patent Office

EUROPEAN SEARCH REPORT

0077512
Application number

EP 82 10 9370.5

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	DE - A1 - 2 915 810 (H.J. TÖPFER) * claim 1 * --	
A	DE - A1 - 2 541 703 (AMERICAN POTATO CO.) * claim 1 * ----	

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

A 23 L 1/216

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

A 23 L 1/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same category
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	30-12-1982	SCHULTZE

EPO Form 1503.1 06.78